



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,445	10/16/2003	Nicholas P. Murphy	84862F-P	8757

7590 11/28/2006

Milton S. Sales  
Patent Legal Staff  
Eastman Kodak Company  
343 State Street  
Rochester, NY 14650-2201

EXAMINER

MOTSINGER, SEAN T

ART UNIT	PAPER NUMBER
----------	--------------

2635

DATE MAILED: 11/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/687,445

Applicant(s)

MURPHY, NICHOLAS P.

Examiner

Sean Motsinger

Art Unit

2635

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 8, 13-14, 16, 18, 20-22 is/are rejected.
- 7) ☒ Claim(s) 8, 10-12, 15, 17 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 10/16/03
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

***Objections to the Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
2. The following title is suggested: Method of Quantifying the Sharpness of a Digital Image.

***Objections to the Claims***

3. Claims 13,16 are objected to because of the following informalities: stored edge profiles lacks antecedent basis. Appropriate correction is required.
4. Claim 8, 10-12,15,17, 19 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Rejections Under 35 U.S.C. 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claim 22 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The Claimed subject matter is directed to software which is abstract and does not comply with 35 U.S.C. 101. Please note that 35 U.S.C. was not invoked because a computer program is sufficient description for the means.

***Rejections Under 35 U.S.C. 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 1-4,14, rejected under 35 U.S.C. 102(b) as being anticipated by “No-reference sharpness metric based on local edge kurtosis” Caviedes, J.; Gurbuz, S.; Image Processing, 2002. Proceedings 2002. International conference on. Volume 3, 24-28 June 2002 Page(s):III-53 - III-56 vol.3 hereinafter “Caviedes.”
7. Re Claim 1 Caviedes discloses a method of quantifying the sharpness of a digital image, comprising the steps of:
  8. identifying a plurality of edges in a digital image; (see section 3 Paragraph 1 lines 1-3)
  9. and, calculating an image sharpness metric value representative of the sharpness of the digital image based on the identified edges. (Section 4 paragraph 3 lines 1-5).
10. Re Claim 2 Caviedes discloses a method according to claim 1, in which the step of calculating an image sharpness metric value further comprises the step of determining an aggregate edge profile representative of said image, from said identified edges;(see figure 2 Note that the profile is aggregate because it contains

Art Unit: 2635

all the edges) and, calculating the image sharpness metric value based on the aggregate edge profile. (see section 3 paragraph 2 lines 8-12).

11. Re Claim 3 Caviedes further discloses a method according to claim 1, in which the step of calculating an image sharpness metric value representative of the sharpness of the digital image further comprises the step of calculating a Kurtosis (i.e. sharpness metric value) for each of the identified edge pixels (i.e. edges) and calculating the average Kurtosis (i.e image sharpness metric value) based on the calculated Kurtosis for each of the identified edge pixels (see section 4 paragraphs 1,2,3)
12. Re Claim 4 Caviedes further discloses the method, in which the step of identifying a plurality of edges is performed using an edge detection operator on the digital image. (see section 3 paragraph 1 lines 7-9)
13. Re Claim 6 Caviedes further discloses, the method in which the edge detection operator is selected from the group consisting of a Sobel edge detector, a Canny edge detector and a Prewitt edge detector. (see section 3 paragraph 1 lines 7-9)
14. Re Claim 14 Caviedes further discloses The method , in which the image sharpness metric value is defined as an average of the sharpness metric values obtained from each of the identified edges. (see section 4 paragraphs 1,2,3)

15. Claim 1, 18, 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuwata et al. US 6,392,759 hereinafter "Kuwata"
16. Re claim 1 Kuwata discloses a method of quantifying the sharpness of a digital image, comprising the steps of:
  17. identifying a plurality of outline portions ( i.e. edges) in a digital image. (see column 11 lines 10-20)
  18. and, calculating an image sharpness metric value representative of the sharpness of the digital image based on the identified edges. (see Equation 5 and column 11 lines 64-67)
19. Re claim 18 Kuwata discloses controlling the sharpness of an image, comprising the steps of:
  20. quantifying the sharpness of the image in accordance with the method of claim 1, to provide an image sharpness metric value representative of the image sharpness; (See above rejection for claim 1)
  21. adjusting the aggressiveness of a digital sharpening algorithm in dependence on a calibrated relationship between the aggressiveness of the digital sharpening algorithm and the image sharpness metric value. ( see column 12 lines 10-20 and equation 6 and column 5 lines 33-42) Note that the Sharpness Value is used to create the image enhancement level and the desired image enhancement level is

Art Unit: 2635

controlled by an unsharp mask. Also note some calibration must inherently be done to assign what size filter to use for what enhancement level you need.

22. Re Claim 20 Kuwata discloses the aggressiveness of the digital sharpening algorithm is defined by the gain of an unsharp-mask filter. (see Column 5 line 34)

Note change the size of a filter is a way to adjust the gain.

23. Claim 1, 2, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Banker et al US 6,275,600 hereinafter "Banker"

24. Re claim 1 Banker discloses A method of quantifying the sharpness of a digital image, comprising the steps of:

25. identifying a plurality of boundries (ie edges) in a digital image; (see column 4 lines 48-53 and column 8 line 7-12 and figure 2 element 16e)

26. and, calculating an image sharpness metric value representative of the sharpness of the digital image based on the identified boundries. ( see column 8 lines 12-22) Note edge uniformity is a sharpness metric.

27. Re claim 2 Banker further discloses the step of calculating an image sharpness metric value further comprising the step of determining an average edge profile representative of said image, from said identified edges; and, calculating the image sharpness metric value based on the average edge profile. (see column 8 lines 12-

Art Unit: 2635

22) Note the system averages pixels near the edge to calculate an average edge profile (i.e. Aggregate edge profile)

28. Re claim 13 Banker further discloses average edge profile is determined in dependence on the stored edge profiles is selected from the group consisting of taking the median of the stored edge profiles, taking a mean of the stored edge profiles and calculating a weighted sum of stored edge profiles. (see column 8 lines 12-22) Note this is the same averaging stored edge profiles since the edge profiles are stored in the image and merely extracted to create the aggregate.

### ***Rejections Under 35 U.S.C. 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

29. Claims 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caviedes in view of Medioni et al US 4849914 hereinafter "Medioni".

30. Re Claim 5 Caviedes discloses the method according to claim 4. Caviedes does not disclose in which the step of identifying a plurality of edges is performed using an



edge detection operator on a low-resolution version of the digital image. Medioni discloses the idea of performing edge detection using a low resolution version image ( see column 3 lines 25-31). The advantage of doing this would be to reduce computation time ( see column 3 lines 25-31). There for it would have been obvious to one of ordinary skill in the art combine Caviedes with Medioni to reach the aforementioned advantage.

31. Re Claim 9 Medioni further discloses the method, in which the positions of the identified edges detected in the low-resolution image are interpolated to identify corresponding edges in a full-resolution version of the image (see column 3 lines 28-35).
32. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caviedes in view of Acharya et al US 6,094,508 hereinafter "Acharya".
33. Re Claim 7 Caviedes discloses a method according to claim 4. Caviedes does not disclose in which prior to the operation of the edge detection operator, the image is split up into a number of blocks, and a threshold value for an edge is set for each block. This is disclosed in Acharya column 2 lines 50-60. The reason to do this would be to account for local intensity. (see column 2 lines 40-45). Therefore it would have been obvious to one skilled in the art at the time of the invention to combine Caviedes with Acharya to reach the aforementioned advantage.

34. Claim 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caviedes in view of Common Knowledge in the Art.

35. Re Claim 21 Caviedes discloses receiving as an input a digital image and provide as an output an image sharpness metric value representative of the sharpness of the image, to execute the method steps of claim 1. Caviedes does not disclose a processor adapted to do this. However it is notoriously well known to implement such image processing techniques with a computer processor. The advantage of this is that a computer processor could perform the calculation quickly is also notoriously well known. Therefore it would have been obvious to one skilled in the art at the time of the invention to combine Caviedes with common knowledge in the art to reach the aforementioned advantage.

36. Re Claim 22 Caviedes discloses the method of claim 1. Caviedes does not disclose computer program code means, which when run on a computer cause said computer to execute the method steps of claim 1. However it is notoriously well known to implement such image processing algorithms with computer code. The motivation to do this that a computer could perform the calculation quickly is also notoriously well known. Therefore it would have been obvious to one skilled in the art at the time of the invention to combine Caviedes with common knowledge in the art to reach the reach the aforementioned advantage.

37. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Banker in view of Rangayyan et al "Algorithm for the computation of region-based image edge profile acutance" Journal of Electronic Imaging January 1995 Vol. 4 hereinafter "Rangayyan."
38. Re Claim 16 Banker further discloses an approximation of change by fitting a line to the edge profile and determining the slop Banker does not disclose in which the image sharpness metric value is defined as follows: 
$$\text{Sharpness metric value} = \frac{1}{N} \sum_{k=1}^N (x_{c-1+k} - x_{c-k}) \cdot W_k$$
 in which N is the number of gradients values to measure; c is a co-ordinate representing the center of the aggregate edge profile; k is the profile sample offset;  $x_{\text{sub}.k}$  is the profile sample value at a position defined by k; and,  $W_{\text{sub}.k}$  is a weighting vector which gives greater significance to the gradient measurements the closer they are made to the center of the aggregate edge profile. Banker discloses using  $\frac{1}{4} \sum_{i=1}^4 (F(i) - b(i) / 2i)$  where  $i=k$  and  $4=N$  and  $x_{c-1+k} = F(i)$  and  $x_{c-k} = B_i$  and  $W_k = 2i$ . See equation 1 and Figure 2. One of ordinary skill in the art would know that this approximation of the derivative (ie gradient, slope) is simpler to compute then fitting a line. There for it would have been obvious to one of ordinary skill in the art to combine these modify Banker with Rangayyan to achieve the aforementioned advantage.

**Allowable Subject Matter**

39. Claims 8 10-12,15,17, 19 contain allowable subject matter. Claim 8 contains patentable subject matter because the threshold used in Acharya is not the RMS algorithm. Claim 10 contains patentable subject matter because Caviedes nor Li et al US 7,099,518 discloses does not disclose rejecting any of actual edge profiles, although Li discusses careful selection of edge points. Claim 19 contains allowable subject matter because there is no training of the sharpness metric in Kuwata.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean Motsinger whose telephone number is 571-270-1237. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marvin Lateef can be reached on 571-270-1245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2635

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Motsinger  
11/17/2006



**MARVIN LATEEF**  
**SUPERVISORY PATENT EXAMINER**